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**Tanaka**

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(54) **CLEANING SHEET**

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*A47L 13/16* (2006.01)

(52) **U.S. Cl.** ..... **15/228**; 15/208; 15/209.1; 442/328; 442/329; 442/381

(58) **Field of Classification Search** ..... 15/208, 15/209.1, 228; 442/328, 329, 381; 401/137–140
See application file for complete search history.

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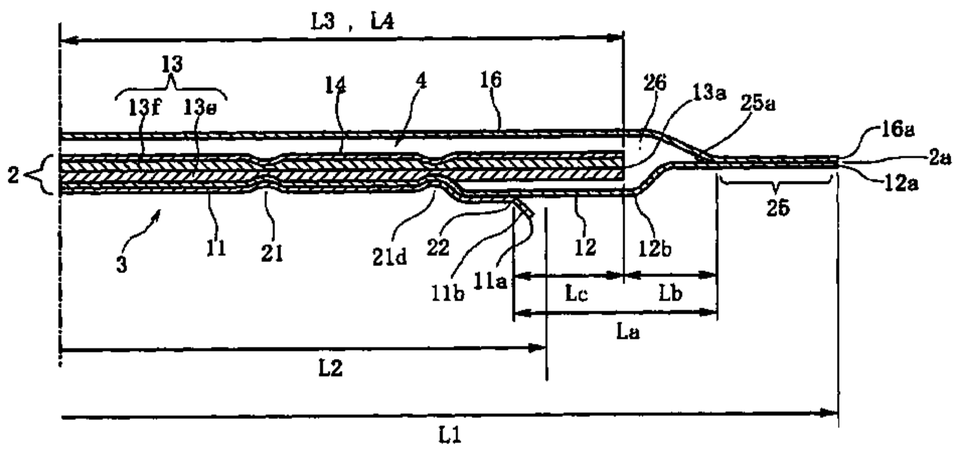
(57) **ABSTRACT**

Disclosed is a cleaning sheet including a main body which is intended to be placed on a bottom face of a cleaning head and attachment sheets which extend from the main body and are intended to be secured on a top face of the cleaning head. The main body has an attachment surface and a cleaning surface on opposite sides. The attachment surface is intended to face the bottom face of the cleaning head. The main body includes a substrate sheet and a stretchable support sheet disposed on a cleaning surface side of the substrate sheet to have projections extending beyond opposite side edges of the substrate sheet. Each attachment sheet is joined to a respective projection of the support sheet.

**7 Claims, 6 Drawing Sheets**



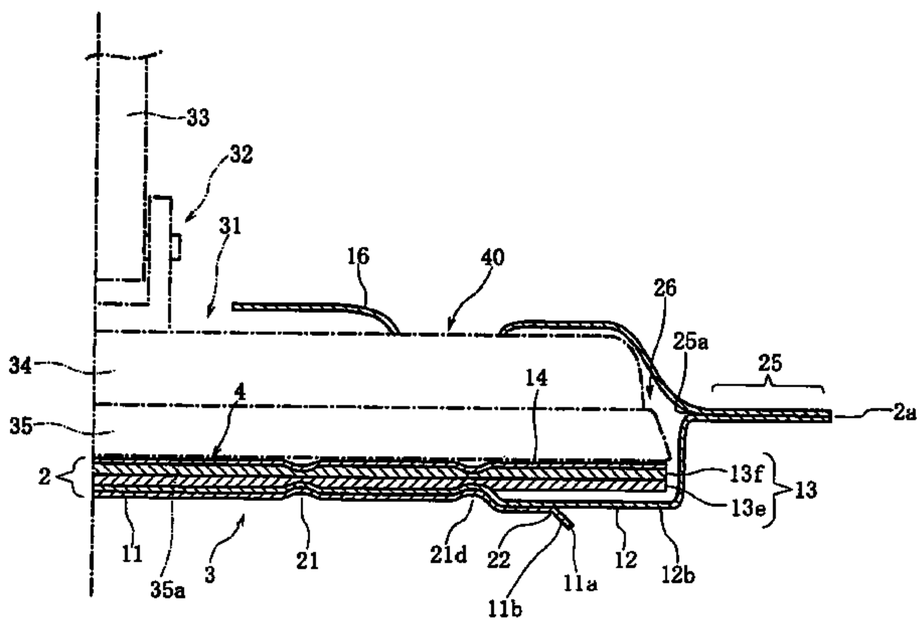
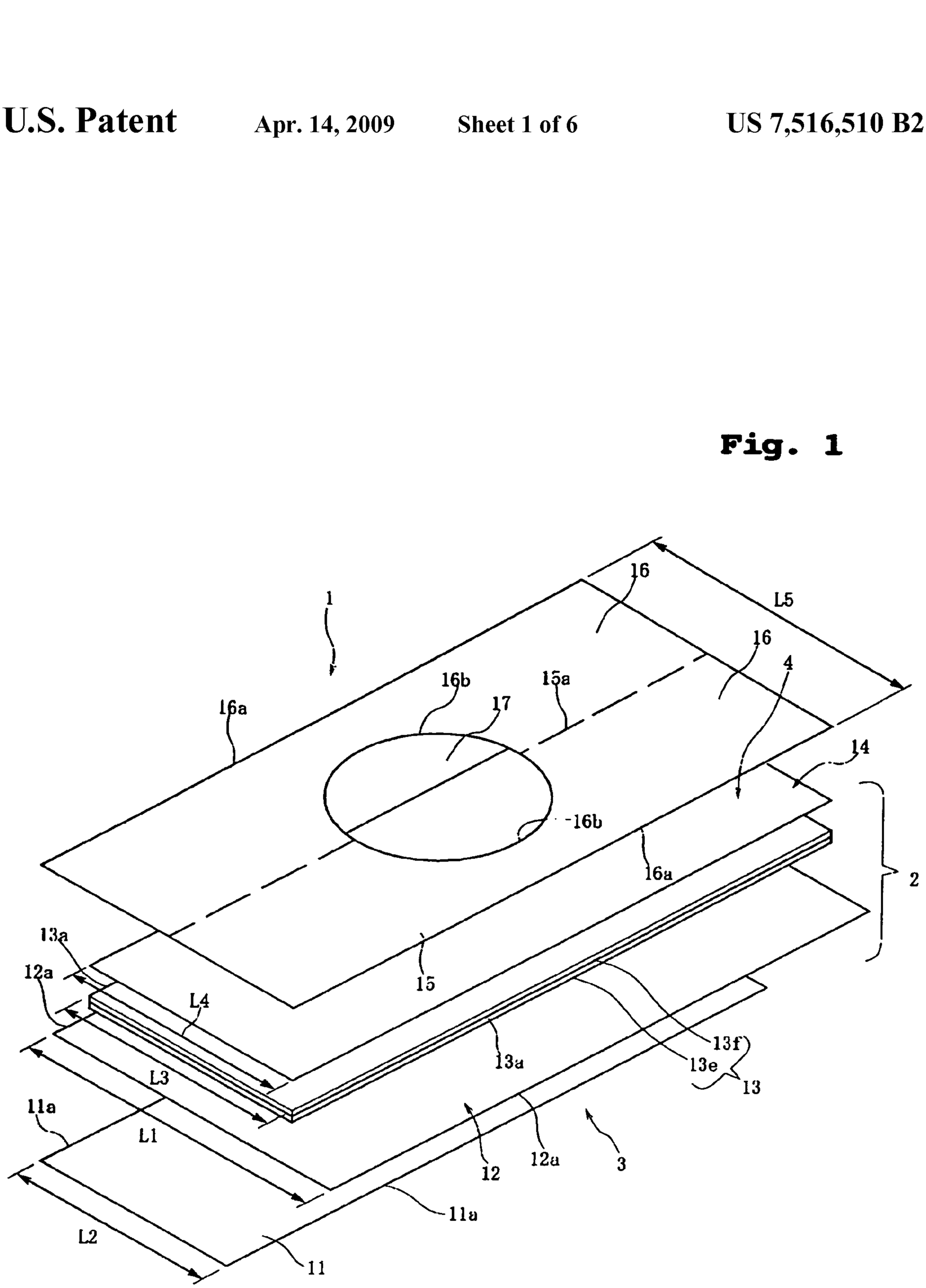



Fig. 1


1
16
L5
16
4
16b
15a
17
16a
14
16b
16a
2
13a
12a
15
L4
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13f
13e
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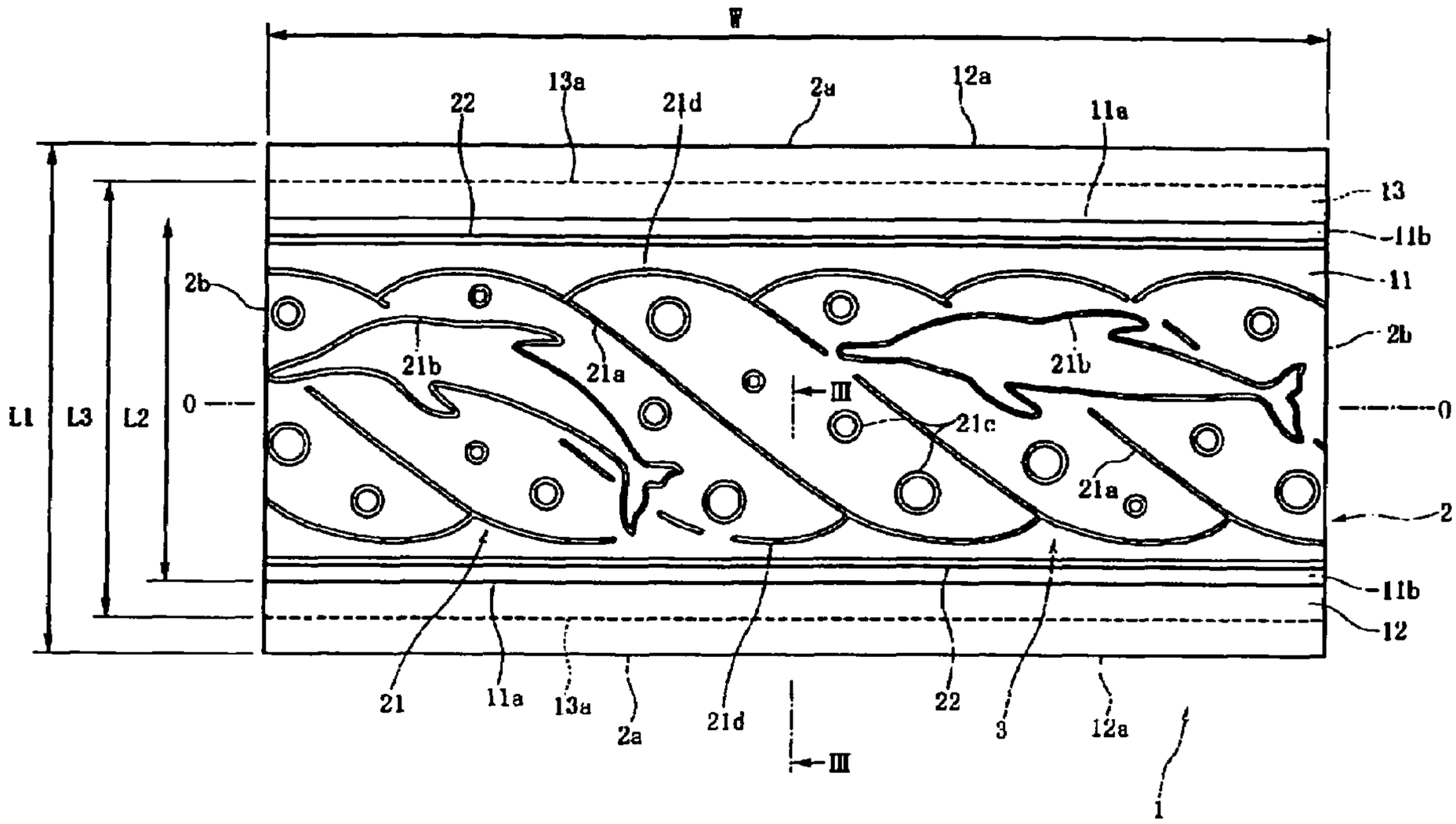
L3
11a
L1
12a
3
12
11a
L2
11

Fig. 2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2
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2b
21b
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21b
21a
21c
III
L1
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L2
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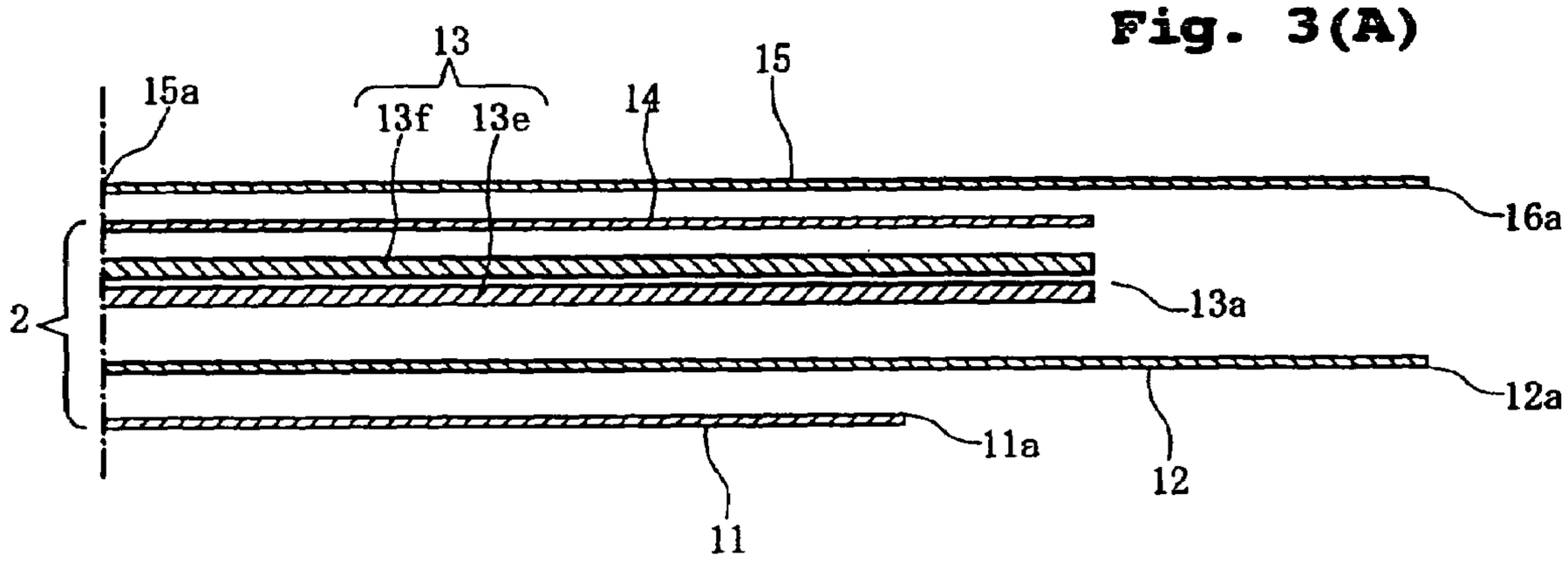
13a
2a
21d
22
3
12a
III

Fig. 3(A)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13f
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16a
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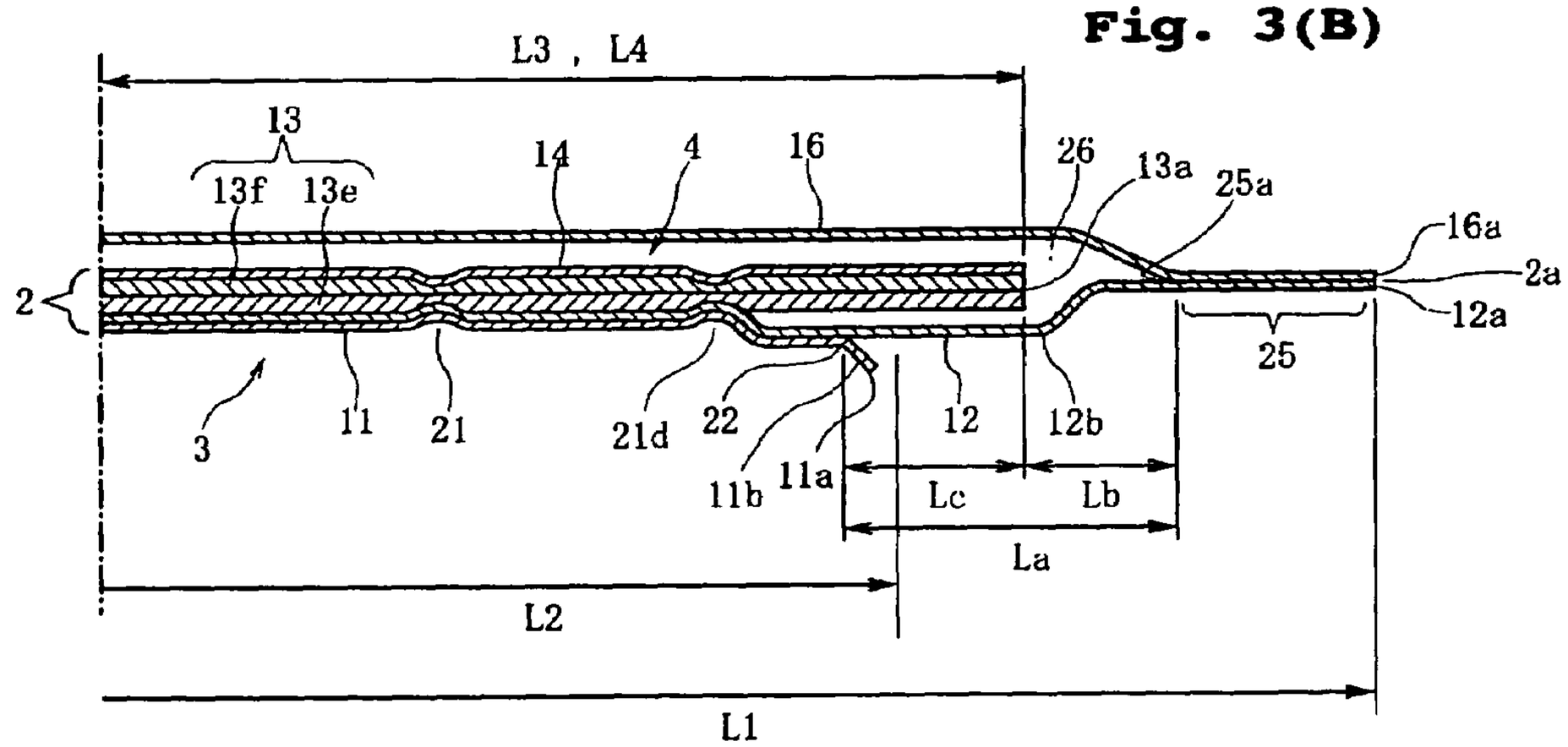
12a
11a
12
11

Fig. 3(B)


L3 , L4
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13f
13e
14
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26
13a
25a
16a
2a
12a
2
25
3
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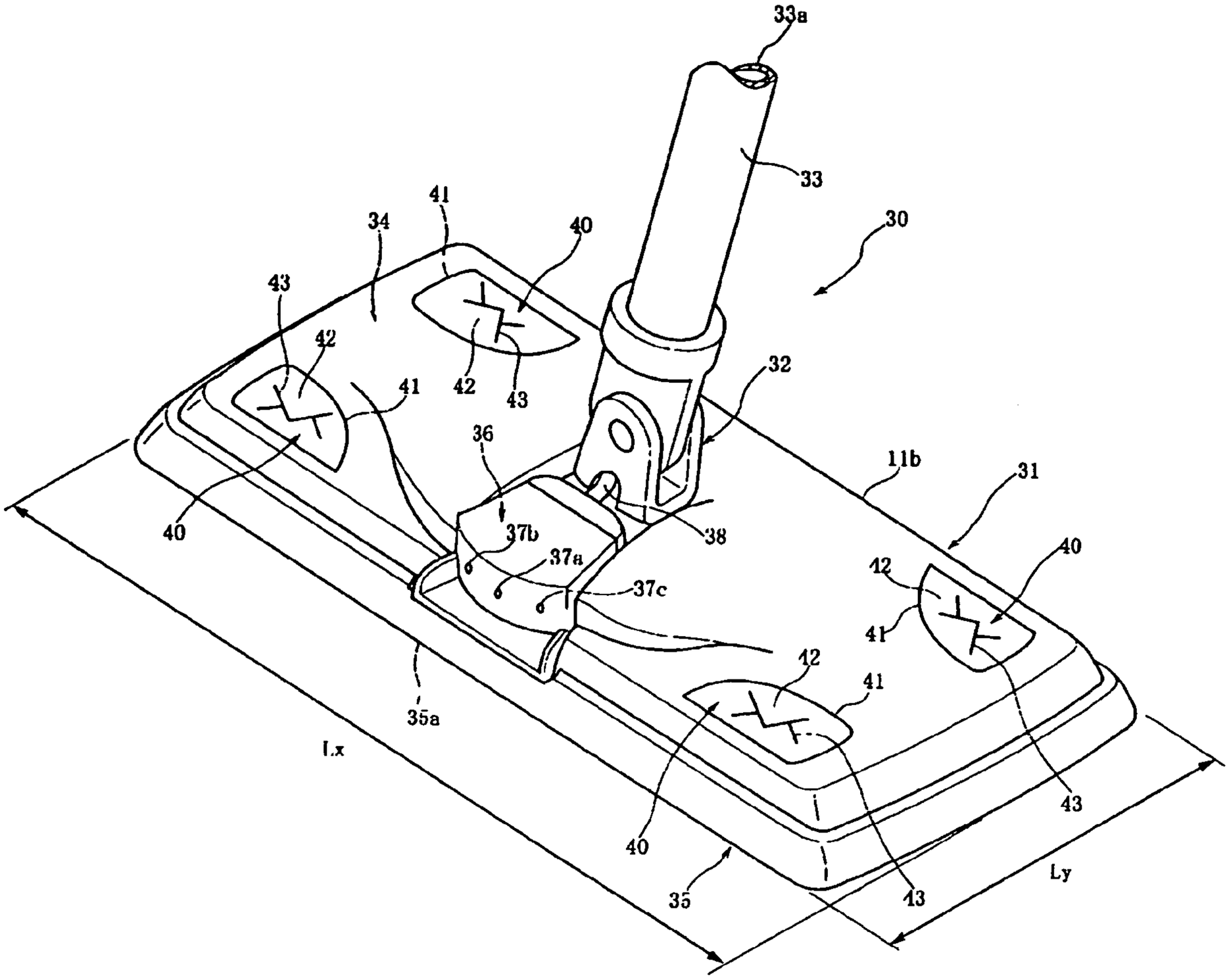
21
21d
22
12
12b
11b
11a
Lc
Lb
La
L2
L1

Fig. 4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11b
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43
35a
Lx
40
35
13
Ly

Fig. 5

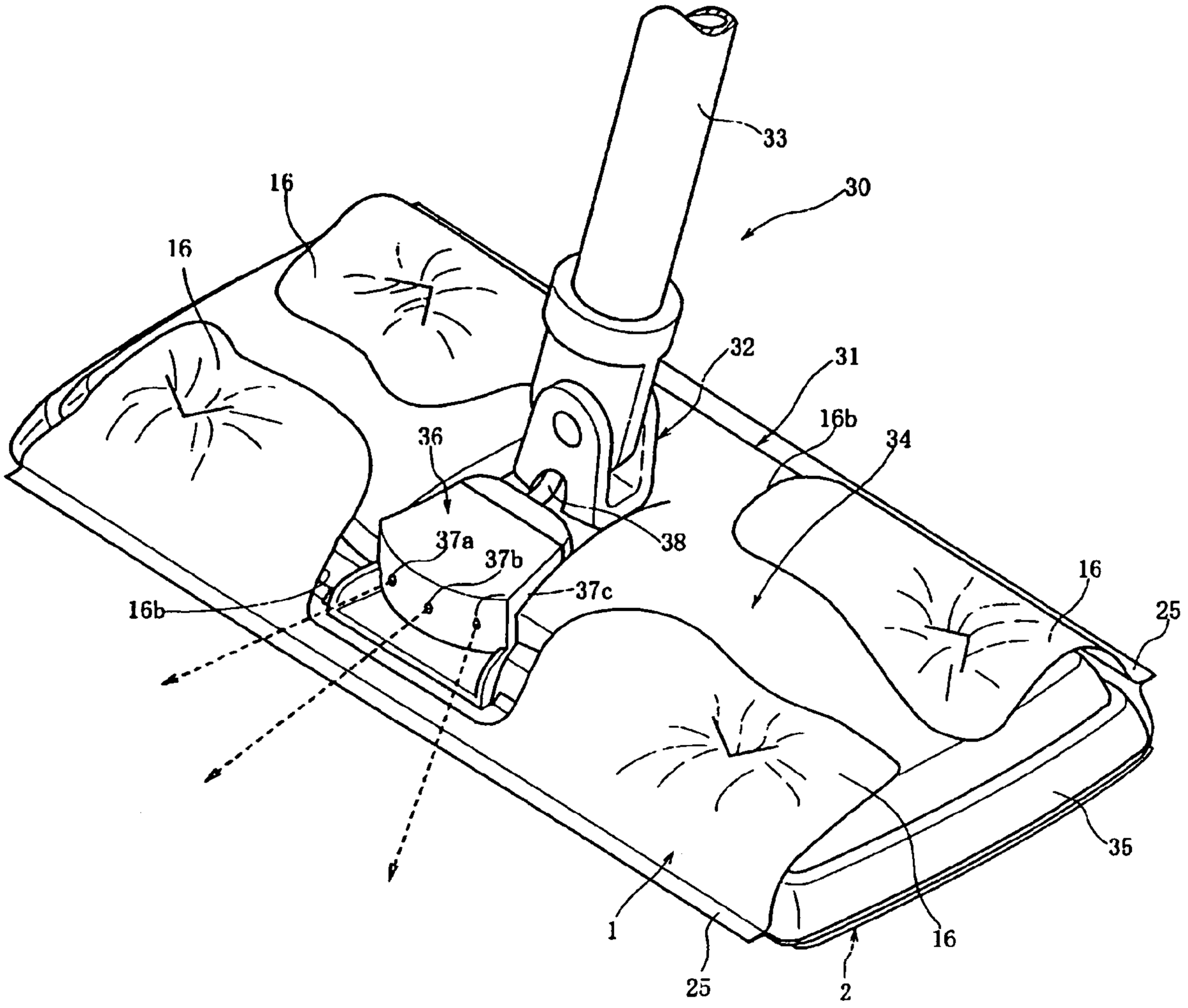
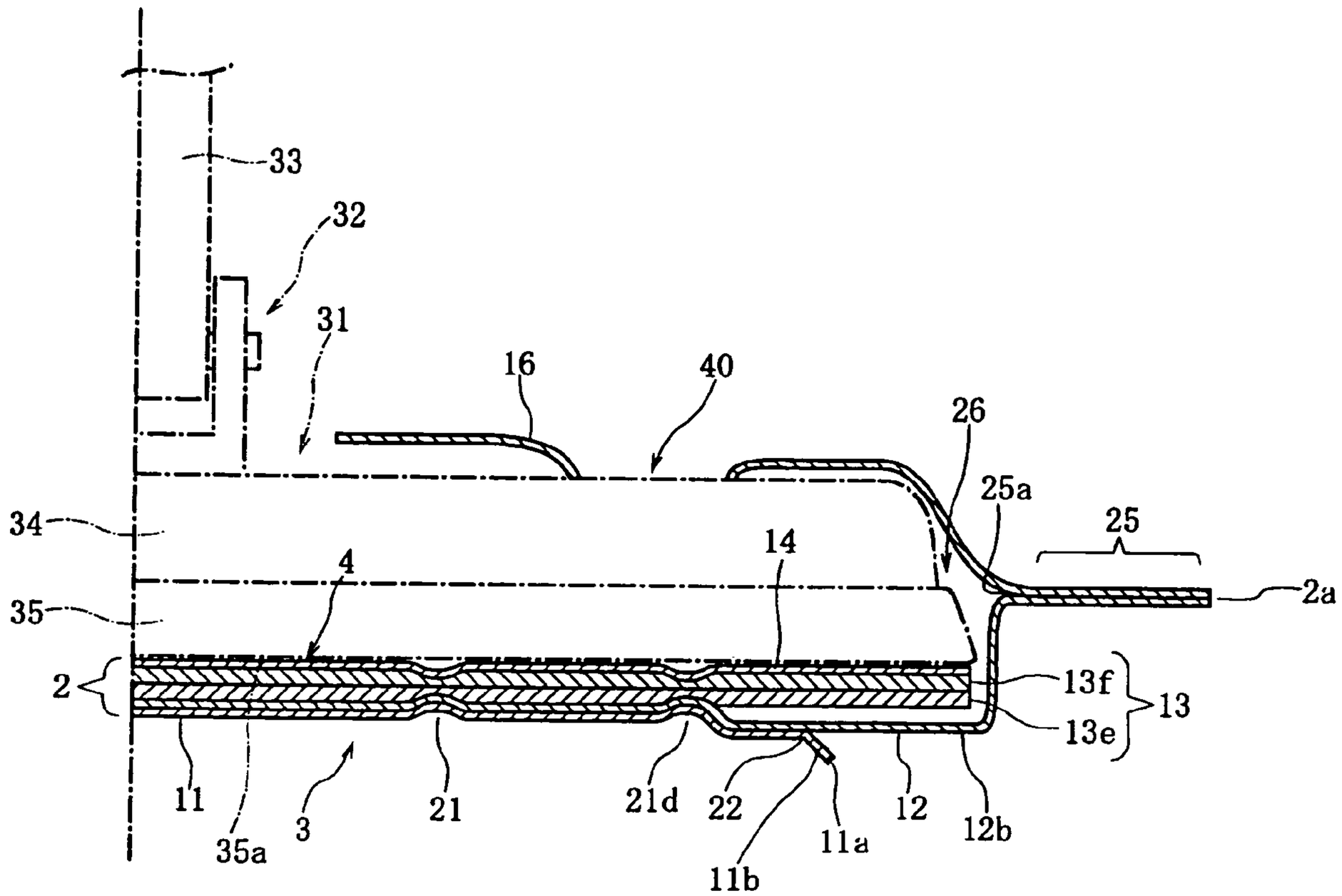


Fig. 6


33
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31
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25a
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2a
35
2
13f
13
13e
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35a
3
21
21d
22
11a
12
12b
11b

# CLEANING SHEET

## BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a cleaning sheet which is intended to be attached to a cleaning head provided at a front end of a mop-like cleaning device or the like, and more particularly to a cleaning sheet which can be tightly fixed on a bottom face of the cleaning head.

2. Description of the Related Art

There have been known mop-like cleaning devices with a cleaning head at a front end for cleaning the house floor or the like. To this cleaning head of the cleaning device, there may be attached a disposable cleaning sheet formed from a nonwoven fabric or the like.

Japanese Utility-Model Registration No. 3022675 discloses a cleaning device with slits on the top face of the cleaning head for attachment of the cleaning sheet. The cleaning sheet can be fixed on the cleaning head such that opposite side portions of the cleaning sheet, whose central portion is located beneath the bottom face of the cleaning head, are folded back upon the top face of the cleaning head and tucked into the slits.

On the other hand, Japanese Unexamined Patent Application Publication No. H09-182706 discloses a cleaning device with pivotable clamping members on the top face of the cleaning head. The cleaning sheet can be fixed on the cleaning head such that opposite side portions of the cleaning sheet, whose central portion is located beneath the bottom face of the cleaning head, are folded back upon the top face of the cleaning head and held between the clamping members and the cleaning head.

Conventional cleaning devices have the following problems.

Conventional cleaning sheets, which are typically constructed of one or more nonwoven fabrics, are not stretchable at all or stretchable but with an extremely low elongation percentage. Accordingly, when the opposite side portions of the cleaning sheet, whose central portion is located beneath the bottom face of the cleaning head, are secured by the slits or the clamping members on the top face of the cleaning head, the whole cleaning sheet tends to be loose around the cleaning head, which may cause displacement between the cleaning sheet and the cleaning head when the cleaning sheet is slid on a floor surface or the like.

Japanese Unexamined Patent Application Publication No. H11-295 discloses a stretchable cleaning sheet which has an elongation percentage of 20% or less under a load of 5 N/30 mm. However, this stretchable cleaning sheet has a uniform construction throughout and therefore has a uniform stretchability throughout. Accordingly, when the cleaning sheet is attached to the cleaning head in such a manner that the opposite side portions of the cleaning sheet are pulled and secured by the slits or the clamping members, the pulling force is spread over the whole cleaning sheet, which makes it difficult to tightly fix the cleaning sheet on the bottom face of the cleaning head.

Cleaning sheets of this type are typically constructed to be suitable for cleaning in the central portion located between the opposite side portions, and therefore, when the displacement occurs, one of the opposite side portions, which are not suitable for cleaning, tends to be positioned on the bottom face of the cleaning head.



## SUMMARY OF THE INVENTION

The present invention has been developed to solve the problems in the prior art set forth above and has an object to provide a cleaning sheet whose main body can be tightly fixed on a bottom face of a cleaning head, preventing displacement during use.

According to the present invention, there is provided a cleaning sheet comprising a main body which is intended to be placed on a bottom face of a cleaning head and attachment sheets which extend from the main body and are intended to be secured on a top face of the cleaning head,

the main body having an attachment surface and a cleaning surface on opposite sides, the attachment surface being intended to face the bottom face of the cleaning head, the main body including a substrate sheet and a stretchable support sheet disposed on a cleaning surface side of the substrate sheet to have projections extending beyond opposite side edges of the substrate sheet, each attachment sheet being joined to a respective projection of the support sheet.

Under an equal tensile stress, the support sheet may have a higher elongation percentage than the substrate sheet and the attachment sheet.

When the cleaning sheet of the present invention is fixed on the cleaning head to have the main body beneath the bottom face of the cleaning head with the attachment sheets placed on the top face of the cleaning head, the projections of the support sheet can be slightly stretched to tightly press the opposite side portions of the substrate sheet against the bottom face of the cleaning head. This effectively prevents displacement of the substrate sheet on the bottom face of the cleaning head.

Preferably, the support sheet has an elongation percentage of 10% or more when a tensile load of 2 N per 25 mm width is exerted for 30 seconds in a direction along which the projections project from the substrate sheet and a recovery percentage of 90% or more after 30 seconds after removal of the tensile load.

Preferably, each attachment sheet is joined at a proximal end to an attachment surface side of the support sheet in face-to-face relationship while having a distal end directed toward center of the main body. With this construction, the attachment sheets and the support sheet form pockets, which open toward the center of the main body, on opposite sides of the main body. Accordingly, the cleaning sheet can be attached to the cleaning head with the opposite side portions of the cleaning head disposed in the pockets, which prevents displacement between the cleaning sheet and the cleaning head more effectively.

According to one embodiment of the present invention, the attachment sheets may be joined to the support sheet at locations spaced outward from the opposite side edges of the substrate sheet. With this construction, when the substrate sheet of the main body is laid beneath the bottom face of the cleaning head, the join portions between the support sheet and the attachment sheets may be placed on side walls of the cleaning head rather than on the bottom face, which is intended to face a floor surface or the like. This enables the whole bottom face of the cleaning head to be effectively exploited as a cleaning face and prevents the join portions from damaging a delicate floor surface or the like.

According to one embodiment of the present invention, the support sheet may be joined to the cleaning surface side of the substrate sheet at locations spaced inward from the opposite side edges of the substrate sheet and may be permitted to stretch outside the locations where the support sheet is joined to the substrate sheet. In this construction, the stretchable portions of the support sheet may be so adjusted that the

substrate sheet will be tightly pressed against the bottom face of the cleaning head by an elastic force of the support sheet.

According to one embodiment of the present invention, the support sheet may be a through-air bonded nonwoven fabric.

## BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be understood more fully from the detailed description given hereinafter and from the accompanying drawings of the preferred embodiment of the present invention, which, however, should not be taken to limit the invention, but are for explanation and understanding only.

In the drawings:

FIG. **1** is an exploded perspective view of a cleaning sheet according to one embodiment of the present invention;

FIG. **2** is a bottom view showing a cleaning surface of the cleaning sheet;

FIG. **3**(A) is a half sectional view of the cleaning sheet taken along line III-III of FIG. **2**, wherein components are in an exploded state before joining, FIG. **3**(B) is a half sectional view of the cleaning sheet taken along line III-III of FIG. **2**, wherein components are joined together;

FIG. **4** is a perspective view of a cleaning head suitable for attachment of the cleaning sheet;

FIG. **5** is a perspective view showing a state where the cleaning sheet is attached to the cleaning head; and

FIG. **6** is a half sectional view showing a state where the cleaning sheet is attached to the cleaning head.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention will be discussed hereinafter in detail in terms of the preferred embodiment according to the present invention with reference to the accompanying drawings. In the following description, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It will be obvious, however, to those skilled in the art that the present invention may be practiced without these specific details. In other instance, well-known structures are not shown in detail in order to avoid unnecessary obscuring of the present invention.

FIG. **1** is an exploded perspective view of a cleaning sheet according to one embodiment of the present invention; FIG. **2** is a bottom view showing a cleaning surface of the cleaning sheet; FIG. **3**(A) is a half sectional view of the cleaning sheet taken along line III-III of FIG. **2**, wherein components are in an exploded state before joining, FIG. **3**(B) is a half sectional view of the cleaning sheet taken along line III-III of FIG. **2**, wherein components are joined together; FIG. **4** is a perspective view of a cleaning head suitable for attachment of the cleaning sheet; FIG. **5** is a perspective view showing a state where the cleaning sheet is attached to the cleaning head; and FIG. **6** is a half sectional view showing a state where the cleaning sheet is attached to the cleaning head.

A disposable cleaning sheet **1** according to one embodiment of the present invention is designed to be attached to a cleaning head **31** of a cleaning device **30**, as shown in FIG. **5**.

As shown in FIGS. **1**, **2**, **3**(A), **3**(B), **5** and **6**, the cleaning sheet **1** comprises a main body **2**, which is intended to be placed on a bottom face **35***a* of the cleaning head **31**, and attachment sheets **16**, **16**, which extend from opposite sides of the main body **2** and are intended to be secured on a top face of the cleaning head **31**. The main body **2** has an attachment surface **4**, which is intended to face the bottom face **35***a* of the cleaning head **31**, and a cleaning surface **3**, which is on the opposite side from the attachment surface **4** and intended to come into contact with an object to be cleaned.

As shown in the bottom view of FIG. **2**, the main body **2** is of a rectangular shape, of which two parallel longer sides are designated "side edges **2***a*, **2***a*" and two parallel shorter sides are designated "end edges **2***b*, **2***b*". When the cleaning sheet **1** is used for cleaning a floor surface or the like, either of the side edges **2***a*, **2***a* is preferably situated forward in a wiping direction.

As shown in the exploded perspective view of FIG. **1**, the main body **2** of the cleaning sheet **1** is constructed by stacking an exterior sheet **11**, a support sheet **12**, a substrate sheet **13** and a backing sheet **14** in order from the side of the cleaning surface **3**.

The exterior sheet **11**, the support sheet **12**, the substrate sheet **13** and the backing sheet **14** have an equal width W in a direction parallel to the longer side (hereinafter called "transverse direction"). In a direction parallel to the shorter side (hereinafter called "longitudinal direction"), on the other hand, the support sheet **12** has a length L**1**, the exterior sheet **11** has a length L**2**, the substrate sheet **13** has a length L**3** and the backing sheet **14** has a length L**4**. As shown in FIG. **2**, the length L**1** of the support sheet **12** is equal to the length of the main body **2**.

The length L**3** of the substrate sheet **13** is equal to the length L**4** of the backing sheet **14**. The length L**3**/L**4** is shorter than the length L**1** of the support sheet **12** and side edges **12***a*, **12***a* of the support sheet **12** are located outside side edges **13***a*, **13***a* of the substrate sheet **13**, as shown in FIGS. **2** and **3**(B).

The length L**3** of the substrate sheet **13** is almost equal to or shorter than a length Ly of the cleaning head **31** shown in FIG. **4**. On the other hand, the width W of the main body **2** is almost equal to a length Lx of the cleaning head **31**.

As shown in FIG. **3**(B), the length L**2** of the exterior sheet **11** is shorter than the length L**3** of the support sheet **12** and the length L**4** of the backing sheet **14**. In the cleaning surface **3** of the main body **2**, accordingly, the exterior sheet **11** is located centrally (symmetrically about a centerline O-O) on the lower surface of the support sheet **12**, as shown in FIGS. **2** and **3**(B). Between the side edges **13***a* of the substrate sheet **13** and side edges **11***a* of the exterior sheet **11**, the support sheet **12** is exposed externally. Furthermore, the support sheet **12** extends outward beyond the side edges **13***a* of the substrate sheet **13**.

The dimensions of the substrate sheet **13** are not particularly limited as long as the cleaning sheet **1** can be suitably used for cleaning a floor surface or the like, but for example, the length L**3** may be about 60 to 160 mm, the width W may be about 200 to 1000 mm.

The exterior sheet **11** and the support sheet **12** both contain heat-fusible synthetic resin fibers. The exterior sheet **11**, the support sheet **12** and the substrate sheet **13** may be joined together by heating them under pressure, such as by heat embossing or ultrasonic embossing. FIG. **2** shows join lines **21** where the exterior sheet **11**, the support sheet **12** and the substrate sheet **13** are joined together. The join lines **21** include wavy lines **21***a* representing an image of waves, complicatedly curved lines **21***b* representing an image of dolphins, and circular lines **21***c* representing an image of bubbles.

The wavy lines **21** have convexly curved portions near the side edges **2***a* of the main body **2** to provide boundaries **21***d*. In the area between the boundaries **2***d*, the exterior sheet **11**, the support sheet **12** and the substrate sheet **13** are partially joined together. The boundaries **21***d* are spaced from the side edges **13***a* of the substrate sheet **13** toward the centerline O-O. In the areas outside the boundaries **21***d*, as shown in FIG.

3(B), the support sheet **12** is not joined to the substrate sheet **13** and is allowed to move freely.

Likewise, the boundaries **21***d* are spaced from the side edges **11***a* of the exterior sheet **11** toward the centerline O-O. In the areas outside the boundaries **21***d*, the exterior sheet **11** is not joined to the substrate sheet **13**. However, the exterior sheet **11** is joined to the support sheet **12** in the areas outside the boundaries **21***d*. This joining may be performed by heat embossing or ultrasonic embossing, which provides join lines **22**. As shown in FIG. **2**, the join lines **22** are spaced inward from and parallel to the side edges **11***a* of the exterior sheet **11**. In the areas outside the join lines **22**, as shown in FIG. **3**(B), the exterior sheet **11** is allowed to move freely away from the support sheet **12**. These freely movable side edge portions of the exterior sheet **11** are flaps **11***b*.

On the other hand, the backing sheet **14** may be bonded to the attachment surface side of the substrate sheet **13** through a hot-melt type adhesive.

As shown in FIG. **1**, a separable sheet **15** is laid on the attachment surface side of the main body **2**. The separable sheet **15** has a cutting line **15***a* along the centerline O-O. This cutting line **15***a* may be perforation. When using the cleaning sheet **1**, the separable sheet **15** may be torn along the cutting line **15***a* to separate into a pair of attachment sheets **16**, **16**. Since the separable sheet **15** has a circular opening **17** in the center thereof, as shown in FIG. **1**, the individual attachment sheets **16**, **16** after separation have semicircular indentations **16***b*, **16***b*.

As shown in FIG. **3**(B), the separable sheet **15** (the attachment sheets **16**, **16**) is laid on the attachment surface side of the support sheet **12** in face-to-face relationship with side edges **16***a* aligned with the side edges **12***a* of the support sheet **12**. Here, the separable sheet **15** is joined to the support sheet **12** to have join portions **25** with a given length as measured from the side edges **12***a*/**16***a* toward the centerline O-O. The join portions **25** may be formed by bonding through a hot-melt type adhesive or heat sealing or ultrasonic sealing.

Each attachment sheet **16** after separation is allowed to move freely over the main body **2** inside an inner end **25***a* of the join portion **25**. That is, each attachment sheet **16** is joined at a proximal end to the support sheet **12** in face-to-face relationship while having a distal end directed toward the centerline O-O. Thus, the main body **2** and the attachment sheet **16** form a pocket **26** inside the inner end **25***a*.

As shown in FIG. **3**(B), the inner end **25***a* is spaced a distance Lb outward from the side edge **13***a* of the substrate sheet **13**. The distance Lb may be 2 mm or more, preferably 4 mm or more, more preferably 5 mm or more.

The support sheet **12** is a stretchable sheet which is permitted to elastically stretch at least in the direction along which the support sheet **12** projects beyond the side edges **13***a* (or at least in the longitudinal direction of the cleaning sheet **1**). Over a distance La between the join line **22** and the inner end **25***a* of the join portion **25**, the support sheet **12** has stretchable portions **12***b* which are permitted to stretch more easily than the other portions. The distance La (or the length of the stretchable portion **12***b*) is preferably 10 mm or more, more preferably 15 mm or more.

Furthermore, the distance Lc between the join line **22** and the side edge **13***a* of the substrate sheet **13** (or the overlap length between the stretchable portion **12***b* and the substrate sheet **13**) is preferably 5 mm or more, more preferably 10 mm or more.

The exterior sheet **11** is a liquid-permeable nonwoven fabric with a high fiber density. This nonwoven fabric contains at least 30 wt. % of synthetic resin fibers treated to be hydrophilic. Therefore, the exterior sheet **11** is wettable and permeable to liquid so that a liquid applied to the exterior sheet **11** can be transferred to the substrate sheet **13**.

According to one embodiment, the exterior sheet **11** may be a spunbonded nonwoven fabric of splittable continuous filaments treated to be hydrophilic, wherein microfibers are split from the continuous filaments by applying high-pressure water stream to the spunbonded nonwoven fabric through water jet nozzles. In the exterior sheet **11** thus manufactured, the splitting of the continuous filaments creates voids which enable liquid permeation through the nonwoven fabric. Moreover, the split microfibers appear on the nonwoven fabric surface in a freely movable independent state, improving the effect of removing soil and making the nonwoven fabric surface soft and comfortable to the touch.

Alternatively, the exterior sheet **11** may be a nonwoven fabric of synthetic resin fibers (e.g., polyethylene (PE) fibers, polypropylene (PP) fibers, polyethylene terephthalate (PET) fibers, nylon fibers, acrylic fibers) treated to be hydrophilic with a surfactant, hydrophilic fibers (e.g., cotton, rayon, pulp), or a combination thereof. The nonwoven fabric may be manufactured by a spunlacing process or a point bonding process.

The support sheet **12** is an elastically stretchable, liquid-permeable nonwoven fabric with a low fiber density. This nonwoven fabric contains at least 70 wt. % of hydrophobic fibers. Preferably, the nonwoven fabric is manufactured by a through-air bonding process, such as by applying hot air to thermally bond PE fibers, PP fibers, PET fibers, PE/PP bicomponent fibers, PE/PET bicomponent fibers, or a combination thereof.

The support sheet **12** may have a basis weight in the range of 10 to 50 g/m$^2$ and a lower fiber density than the exterior sheet **11**, for example, in the range of 0.015 to 0.075 g/cm$^3$.

When measured in the projecting direction away from the side edges **13***a* of the substrate sheet **13**, the support sheet **12** has a higher elongation percentage than any of the substrate sheet **13**, the attachment sheet **16** and the exterior sheet **11**. When measured according to a measurement method that will be described later with reference to Example and Comparative Examples, the elongation percentage of the support sheet **12** is preferably 10% or more, more preferably 14% or more, in the projecting direction away from the side edges **13***a* (or in CD). The upper limit of the elongation percentage is not particularly defined but may be about 50%. The recovery percentage of the support sheet **12** after elongation in that direction (or in CD) is preferably 90% or more, more preferably 93% or more. The elastic modulus of the support sheet **12** is preferably 60% or more.

The elongation at break of the support sheet **12** is preferably 50% or more in that direction (or in CD). Here, the tensile strength at break is preferably 4 N or more per 25 mm width.

The support sheet **12** should not be construed as limited to the through-air bonded nonwoven fabric. For example, there may be employed a nonwoven fabric containing stretchable fibers of polyurethane resin, a stretchable net, a stretchable resin film with a number of apertures, or the like, as long as the elongation percentage and the recovery percentage fall within the specified ranges.

The substrate sheet **13** may be constructed by laying first and second substrate sheets **13***e*, **13***f* one on top of the other. The first and second substrate sheets **13***e*, **13***f* are both capable of absorbing water. According to one embodiment, both the first and second substrate sheets **13***e*, **13***f* may be an air-laid pulp in which pulp deposited by an air-laying process is bonded together through a resin binder. The substrate sheet **13** may have a total basis weight in the range of about 50 to 200

g/m$^2$. Alternatively, the substrate sheet **13** may be another deposited pulp sheet optionally containing superabsorbent polymer (SAP).

The substrate sheet **13** has a higher bending stiffness than the support sheet **12** and is inferior in stretchability to the support sheet **12**, i.e., has a lower elongation percentage than the support sheet **12**. The substrate sheet **13** should not be construed as limited to the air-laid pulp. For example, there may be used a paper material, a resin foam sheet, a nonwoven fabric such as spunlaced or spunbonded, or a stack thereof, as long as it has a higher bending stiffness than the support sheet **12** and is inferior in stretchability to the support sheet **12**.

The substrate sheet **13**, which is capable of absorbing water, can also function to keep the main body **2** unfolded and as a cushion layer between the bottom face of the cleaning head **31** and the floor surface.

The backing sheet **14** may be either of a liquid-blocking sheet and a liquid-permeable sheet. In the case where the backing sheet **14** is a liquid-permeable sheet, there may be employed a through-air bonded nonwoven fabric similar to that employed for the support sheet **12** or a spunlaced nonwoven fabric containing rayon and pulp. In the case where the backing sheet **14** is a liquid-blocking sheet, there may be employed a spunbonded nonwoven fabric or a spunbonded/meltblown (SM) nonwoven laminate treated with a water-repellent agent. Preferably used is a spunbonded nonwoven fabric which is formed of synthetic resin fibers treated to be hydrophilic and has a basis weight of 20 g/m$^2$.

The attachment sheet **16** may be a point-bonded or spunbonded nonwoven fabric of synthetic resin fibers. Preferably used is a spunbonded nonwoven fabric having a basis weight of about 40 g/m$^2$. Alternatively, the attachment sheet **16** may be a resin film. The attachment sheet **16** is inferior in stretchability to the support sheet **12** or substantially not stretchable. The elongation percentage of the attachment sheet **16** is preferably less than 10%, more preferably 5% or less. The recovery percentage is preferably 90% or more and the tensile strength at break is preferably 4 N or more per 25 mm width. It should be noted that preferred ranges of elongation percentage and recovery percentage of the exterior sheet **11** may be identical to those of the attachment sheet **16**.

The cleaning device **30** shown in FIG. **4** has the cleaning head **31**, a shaft **33** connected to the top face of the cleaning head **31** through a universal joint **32**, and a grip (now shown) secured to an upper end of the shaft **33**.

The cleaning head **31** has a generally rectangular contour. The cleaning head **31** is preferably constructed of a rigid holder **34** injection molded of a synthetic resin, such as acrylonitrile-butadiene-styrene (ABS), polyethylene (PE), polypropylene (PP), polyethylene terephthalate (PET), etc., and a pad **35** secured beneath the holder **34**. The pad **35** is preferably formed of a flexible elastic material such as ethylene-vinyl acetate (EVA), urethane, or rubber. The bottom face of the cleaning head **31**, i.e., the bottom face **35***a* of the pad **35** is generally flat.

In the top face, the holder **34** has sheet retainers **40** inside four corners of the rectangle. The sheet retainer **40** is preferably constructed by forming an opening **41** in the top face of the holder **34** and covering the opening **41** with a deformable sheet **42** made of PE, PP, PET, etc. The deformable sheet **42** has a cut **43**. FIG. **5** shows a state where the cleaning sheet **1** is retained on the cleaning head **11** such that the attachment sheets **16**, **16** are pushed into the cuts **43**.

Centrally of the holder **34**, there is mounted a nozzle head **36**. The nozzle head **36** has three nozzles **37***a*, **37***b*, **37***c* whose orifices are directed to one side edge of the cleaning head **31**. The shaft **33** is provided with a container holder (not shown) above the holder **34** for holding a container filled with a liquid. When a valve provided in the container holder is opened by operating a handle provided in the grip, the liquid inside the container can flow through a hollow **33***a* of the shaft **33** and a pipe **38** and into the nozzle head **36** and be squirted out of the cleaning head **31** from the nozzles **37***a*, **37***b*, **37***c*.

Next, how to use the cleaning sheet **1** in combination with the cleaning device **30** will be described.

The cleaning sheet **1** may be attached to the cleaning head **31** with the substrate sheet **13** and the backing sheet **14** of the main body **2** being located beneath the bottom face **35***a* of the pad **35**. At first, the separable sheet **15**, which covers the attachment surface **4** of the main body **2**, is torn along the cutting line **15***a* to separate into the pair of attachment sheets **16**, **16**.

As set forth above, the proximal ends of the attachment sheets **16**, **16** are joined to the support sheet **12** in face-to-face relationship to provide the join portions **25**, whereby the pockets **26** are provided between the confronting faces of the main body **2** and the attachment sheets **16**, inside the inner ends **25***a* of the join portions **25**. When the cleaning head **31** is disposed between the main body **2** and the attachment sheets **16**, as shown in FIG. **6**, the longer side portions of the cleaning head **31** enter the pockets **26**, so that the cleaning sheet **1** can be put in position with the substrate sheet **13** almost coinciding with the bottom face **35***a* of the pad **35**.

Then, the attachment sheets **16**, which lie on the top face of the cleaning head **31**, are pushed into the cuts **43** of the sheet retainers **40**. At this time, since the inner ends **25***a* of the join portions **25** are pulled upward, the stretchable portions **12***b* of the support sheet **12** can be slightly elastically stretched. Accordingly, the side edges **13***a* of the substrate sheet **13** and their vicinities can be tightly pressed against the bottom face **35***a* of the pad **35** by the stretchable portions **12***b*.

It should be noted that although the stretchable portion **12***b* shown in FIG. **6** is spaced away from the substrate sheet **13** and the cleaning head **31** for convenience of illustration, the stretchable portion **12***b* in practice can be tightly pressed against the substrate sheet **13** and the cleaning head **31**. In the present embodiment, as shown in FIG. **3**(B), since the join line **22** where the exterior sheet **11** is joined to the support sheet **12** is spaced inward away from the side edge **13***a* of the substrate sheet **13**, the stretchable portion **12***b* overlaps with the substrate sheet **13** over the distance Lc.

Here, since the join line **22** is spaced inward away from the side edge **13***a* of the substrate sheet **13** and the distance La between the join line **22** and the inner end **25***a* of the join portion **25** is sufficient, the stretchable portion **12***b* can exert a sufficient elastic pressing force to tightly press the substrate sheet **13** against the bottom face **35***a* of the cleaning head **31** even if the elongation percentage of the support sheet **12** is not very high.

In the cleaning sheet **1**, since the attachment sheets **16** are substantially not stretchable or inferior in stretchability, the force exerted to pull up the attachment sheets **16** acts intensively on the stretchable portions **12***b* of the substrate sheet **12**, so that the side edges **13***a* of the substrate sheet **13** and their vicinities can be tightly pressed against the bottom face **35***a* of the cleaning head **31** by the stretchable portions **12***b*.

Should the attachment sheets **16** be highly stretchable, it will be difficult to tightly press the substrate sheet **13** against the bottom face **35***a* because the attachment sheets **16** themselves will be stretched by the force exerted to pull up the attachment sheets **16**.

In the main body **2**, furthermore, the distance Lb is set between the side edge **13***a* of the substrate sheet **13** and the inner end **25***a* of the join portion **25**. Accordingly, when the

cleaning sheet **1** is attached to the cleaning head **31**, the join portions **25** can be placed on the side walls of the cleaning head **31**, rather than on the bottom face **35***a*, as shown in FIG. **6**. That is, the whole exterior sheet **11** can be located on the cleaning face of the cleaning head **31**. This enables the whole bottom face **35***a* of the cleaning head **31** to be effectively exploited for cleaning and prevents the join portions **25** from damaging a delicate floor surface or the like.

When using the cleaning device **30**, the handle of the grip may be operated to squirt the liquid from the nozzles **37***a*, **37***b*, **37***c* of the nozzle head **36** onto the floor surface in front of the cleaning head **31**. After the floor surface is wetted with the liquid, the cleaning head **31** may be moved forward to wipe the floor with the cleaning sheet **1**. The liquid to be squirted from the nozzles **37***a*, **37***b*, **37***c* may be plain water, or may contain a detergent for cleansing a floor surface, a high gloss wax, etc.

Since the exterior sheet **11**, which is exposed externally on the cleaning surface **3** of the main body **2**, and the support sheet **12**, whose opposite side portions are also exposed externally outside the side edges **11***a* of the exterior sheet **11**, are both hydrophilic and permeable to liquid, the liquid applied to the floor surface can pass through the exterior sheet **11** and the support sheet **12** and be absorbed by the substrate sheet **13**, which is capable of absorbing water.

Fine dust or dirt can be collected by the exposed exterior sheet **11**, while relatively large dust can be collected by the exposed side portions of the low-density support sheet **12**. Moreover, the flaps **11***b* of the exterior sheet **11** are effective in removing grime on the floor surface.

Since the substrate sheet **13** can be tightly pressed against the bottom face **35***a* of the cleaning head **31** by an elastic force of the stretchable portions **12***b* of the support sheet **12** with the opposite side portions of the cleaning head **31** being held in the pockets **26** of the cleaning sheet **1**, the substrate sheet **13** can be effectively prevented from being dislocated from the bottom face **35***a* of the cleaning head **31** by a friction caused between the cleaning sheet **1** and the floor surface or the like.

The present invention should not be understood as limited to the foregoing embodiment.

For example, the support sheet **12** may be exposed externally over the cleaning surface **3** of the main body **2** without providing the exterior sheet **11**. Alternatively, the support sheet **12** may not extend over the cleaning surface **3** of the main body **2**, and for example, may be of two separate sheets which are located outside the boundaries **21***d* shown in FIG. **3**(B). Each sheet retainer may be constructed to include a clamping member which is pivotably mounted on the top face of the cleaning head for clamping the attachment sheet **16**.

The cleaning sheet **1** may be attached to various cleaning devices other than the cleaning device **30**. For example, the nozzles may be removed from the cleaning device and the liquid may be applied to the substrate sheet **13** otherwise. Alternatively, the substrate sheet **13** may be incapable of absorbing water and suitable for use in dry conditions.

## EXAMPLE

### (1) Example

For Example, there was prepared a through-air bonded nonwoven fabric having a basis weight of 30 g/m$^2$. This through-air bonded nonwoven fabric was formed of sheath/core (PE/PET) bicomponent fibers and suitable for use as the support sheet **12**.

### (2) Comparative Example 1

For Comparative Example 1, there was prepared a spunbonded nonwoven fabric having a basis weight of 40 g/m$^2$. This spunbonded nonwoven fabric was formed of PP fibers and suitable for use as the attachment sheet **16**.

### (3) Comparative Example 2

For Comparative Example 2, there was prepared a spunbonded nonwoven fabric having a basis weight of 20 g/m$^2$. This spunbonded nonwoven fabric was formed of PP fibers and suitable for use as the backing sheet **14**.

### (4) Comparative Example 3

For Comparative Example 3, there was prepared a spunlaced nonwoven fabric having a basis weight of 39 g/m$^2$. This spunlaced nonwoven fabric was formed of rayon, PET fibers and sheath/core (low-melting PP/high-melting PP) bicomponent fibers.

### (5) Measurement Method

From Example and Comparative Examples 1-3, respectively, there were cut out two types of samples: one having a length of 130 mm along MD (machine direction) and a width of 25 mm along CD (cross direction); the other having a length of 130 mm along CD and a width of 25 mm along MD. Each sample was marked at points which were spaced 100 mm apart from each other in the longitudinal direction.

Both end portions of the sample outside the marks were held by a pair of opposing chucks to set a chuck-to-chuck distance L**0** to 100 mm. The distance between the marks was measured when a tensile load of 2N was applied between the chucks for 30 seconds. This distance upon elongation was designated by L**1**. After measurement of the distance L**1**, one chuck was immediately released from the sample and the distance between the marks was again measured after 30 seconds after removal of the tensile load. This distance after recovery was designated by L**2**.

For Example and Comparative Examples 1-3, respectively, this measurement was performed three times.

### (6) Evaluation

Elongation percentage (%) was obtained by (L**1**−L**0**)/L**0***100. Recovery percentage (%) was obtained by L**0**/L**2***100. Elastic modulus (strain recovery) (%) was obtained by {(L**1**−L**0**)−(L**2**−L**0**)}/(L**1**−L**0**)*100.

### (7) CONCLUSION

The following Table 1 shows measurements of the distance L**1** in both CD and MD for respective Example and Comparative Examples, the averages of three measurements of the distance L**1**, and the calculated elongation percentages.

The following Table 2 shows measurements of the distance L**2** in both CD and MD for respective Example and Comparative Examples, the averages of three measurements of the distance L**2**, and the calculated recovery percentages.

It will be understood from below that the through-air bonded nonwoven fabric prepared for Example is preferably used with CD along the projecting direction away from the substrate sheet **13**.

TABLE 1

| | Example | | Com. Example 1 | | Com. Example 2 | | Com. Example 3 | |
|---|---|---|---|---|---|---|---|---|
| Measurement under Load | CD | MD | CD | MD | CD | MD | CD | MD |
| First Measurement L1 (mm) | 119 | 101 | 100.5 | 100 | 105 | 102 | 149 | 100.5 |
| Second Measurement L1 (mm) | 117 | 102 | 102 | 100 | 103 | 101 | 149 | 101 |
| Third Measurement L1 (mm) | 118 | 101.5 | 101 | 100.5 | 105 | 101 | 154 | 101 |
| Average (mm) | 118 | 101.5 | 101.2 | 100.2 | 104.3 | 101.3 | 150.7 | 100.8 |
| Elongation Percentage (%) | 18 | 1.5 | 1.2 | 0.2 | 4.3 | 1.3 | 50.7 | 0.8 |

TABLE 2

| | Example | | Com. Example 1 | | Com. Example 2 | | Com. Example 3 | |
|---|---|---|---|---|---|---|---|---|
| Measurement after Removal of Load | CD | MD | CD | MD | CD | MD | CD | MD |
| First Measurement L2 (mm) | 105 | 100 | 100.5 | 100 | 100.5 | 100 | 125 | 100 |
| Second Measurement L2 (mm) | 104 | 100.5 | 101 | 100 | 101 | 100 | 125 | 100 |
| Third Measurement L2 (mm) | 103 | 100.5 | 100.5 | 100 | 100.5 | 100 | 128 | 100 |
| Average (mm) | 104 | 100.3 | 100.7 | 100 | 100.7 | 100 | 126 | 100 |
| Recovery Percentage (%) | 96.2 | 99.7 | 99.3 | 100 | 99.3 | 100 | 79.4 | 100 |

What is claimed is:

**1**. A cleaning sheet comprising a main body which is intended to be placed on a bottom face of a cleaning head and attachment sheets which extend from the main body and are intended to be secured on a top face of the cleaning head,

the main body having an attachment surface and a cleaning surface on opposite sides, the attachment surface being intended to face the bottom face of the cleaning head, the main body including a substrate sheet and a stretchable support sheet disposed on a cleaning surface side of the substrate sheet to have projections extending beyond opposite side edges of the substrate sheet, each attachment sheet being joined to a respective projection of the support sheet.

**2**. The cleaning sheet of claim **1**, wherein under an equal tensile stress, the support sheet has a higher elongation percentage than the substrate sheet and the attachment sheet.

**3**. The cleaning sheet of claim **1**, wherein the support sheet has an elongation percentage of 10% or more when a tensile load of 2 N per 25 mm width is exerted for 30 seconds in a direction along which the projections project from the substrate sheet and a recovery percentage of 90% or more after 30 seconds after removal of the tensile load.

**4**. The cleaning sheet of claim **1**, wherein each attachment sheet is joined at a proximal end to an attachment surface side of the support sheet in face-to-face relationship while having a distal end directed toward center of the main body.

**5**. The cleaning sheet of claim **1**, wherein the attachment sheets are joined to the support sheet at locations spaced outward from the opposite side edges of the substrate sheet.

**6**. The cleaning sheet of claim **1**, wherein the support sheet is joined to the cleaning surface side of the substrate sheet at locations spaced inward from the opposite side edges of the substrate sheet and is permitted to stretch outside the locations where the support sheet is joined to the substrate sheet.

**7**. The cleaning sheet of claim **1**, wherein the support sheet is a through-air bonded nonwoven fabric.

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